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Short Communication

PRODUCTION OF SECOND GENERATION PENAEID SHRIMP, *PENAEUS STYLIROSTRIS*, FROM MEXICO

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ABSTRACT

Brown, A., Jr., Tave, D., Williams, T.D. and Duronslet, M.J., 1984. Production of second generation penaeid shrimp, *Penaeus stylirostris*, from Mexico. *Aquaculture*, 41: 81—84.

The life cycle of the penaeid shrimp, *Penaeus stylirostris*, was completed in captivity with the production of F_2 generation nauplii. Over one million F_2 generation nauplii were harvested from the F_1 generation represented by laboratory-reared adult shrimp. The studies were completed in a laboratory simulated, tropical environment for maturation and spawning, and in pond systems located in a temperate environment for growout of the F_1 generation.

INTRODUCTION

The control of events leading to the maturation of gonads and spermatophore transfer in penaeid shrimp (Caillouet, 1973; AQUACOP, 1977; Conte et al., 1977; Brown et al., 1979 and Lawrence et al., 1980) under laboratory conditions has been difficult to achieve. It has been accomplished in the South Pacific with *P. merguiensis* (AQUACOP, 1975), with *P. monodon* (Santiago, 1977; AQUACOP, 1979), and with *P. stylirostris* and *P. vannamei* (AQUACOP, 1979). It has been accomplished in Great Britain with *P. merguiensis* (Beard et al., 1977), and in France with *P. japonicus* (Laubier-Bonichon, 1978). Until now, there has been no reported production of second generation penaeid larvae from a captive F_1 (first filial) generation in North America.

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MATERIALS AND METHODS

Shrimp used in the experiment were adult F_1 generation *P. stylirostris* from parents captured by trawling off the coast of Puerto Penasco, Mexico. The F_1 generation was hatched and reared to postlarvae at the National Marine Fisheries Service, Galveston, TX. The F_1 postlarvae were then stocked in 0.1-ha earthen ponds at Baytown, TX. After 82 days, the shrimp averaged 121 mm in length (tip of rostrum to tip of telson) and 13.1 g in weight. Mean weight was 20.0 g a month later when survivors were returned to the Galveston Laboratory and placed in the shrimp maturation facility (Brown et al., 1980).

Eyestalks of 21 females (approximately 35 g each) were unilaterally ablated according to methods described by Primavera (1978). These females were placed with 29 males in a 3.0 m diameter circular fiberglass maturation tank containing 7400 l of seawater. Seawater in the maturation tank was completely replaced at a rate between 1 and 3 times daily. Incoming water was filtered through a bed of crushed oyster shells. Procedures used to induce ovarian development and spermatophore transfer were the same as those reported in Brown et al. (1979, 1980).

The discharge water from the maturation tank was shunted through an egg collector (Brown et al., 1979) so that spawning activity of females which were not isolated could be detected. Eggs and nauplii were enumerated according to Brown et al. (1979, 1980).

RESULTS AND DISCUSSION

Spawning took place over an extended period; eggs were recovered from the maturation tank's egg collector on 112 days of the 181 day study. Twenty-seven (24%) of the 112 collections contained fertilized eggs. In addition, seventeen females were observed with attached spermatophores and all were successfully spawned in isolation. Fifteen of the seventeen females (88%) produced fertilized eggs (Table I). More than 1 000 000 nauplii were harvested from these fifteen spawns, indicating that a viable F_2 generation was produced.

In Brown et al. (1980), the initial size of wild *P. stylirostris* from Costa Rica and Mexico was 64 g. *P. stylirostris* from Costa Rica produced 397 000 eggs per spawn, and *P. stylirostris* from Mexico 389 000 eggs. In this study, the smaller (35 g) F_1 generation females averaged approximately 295 000 eggs per spawn, above the 70 000 to 100 000 eggs per spawn of the 30 to 40 g Mexican *P. stylirostris* reported by AQUACOP (1979). Nauplii from two spawns were reared to postlarvae. The F_1 females matured and spawned under the same laboratory conditions as the parent generation, as long as diet, photoperiod, salinity and temperature were within acceptable ranges. The completion of the reproductive cycle, including production of second generation nauplii of *P. stylirostris*, suggests that reproductive as well as

TABLE I

Number of eggs, percent fertilization, and number of nauplii harvested from spawns of seventeen isolated female *Penaeus stylirostris* reared from larvae in the laboratory

Estimated number of eggs spawned	Estimated percent fertilized	Estimated number of nauplii harvested
227 000	91	67 000
442 000	16	42 500
307 500	35	107 500
308 000	94	290 000
185 000	27	15 000
118 000	30	18 000
447 000	89	318 000
305 000	0	0
80 000	40	25 000
102 000	39	27 000
445 000	4	5 000
195 000	0	0
120 000	21	20 000
120 000	66	63 000
490 000	18	40 000
310 000	63	105 000
230 000	25	7 500
Total 4 431 500		1 150 500

genetic studies of penaeid shrimp need not be restricted to tropical environments, and that future domestication of penaeid shrimp may be practicable.

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